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(71) Applicant
Montagu Endall,
Manor Cottage, Court, Lane, Offenham, Nr Evesham,
Worcestershire

(72) Inventor
Montagu Endall

(74) Agent and/or Address for Service
A R Davies & Co,
27 Imperial Square, Cheltenham GL50 1RQ

(54) Securing flexible sheet materials

(57) A device for securing flexible sheet material, such as polythene, comprises a substantially rigid elongate channel 10 into which is introduced a resiliently flexible tube 15, the sheet material 16 being trapped between the tube and the inner walls of the channel. The mouth 14 of the channel is reduced in width by the provision of inwardly directed flanges 13, so that the tube is retained within the channel. To lock the tube positively within the channel it may be inflated or a rigid element may be slid into it.

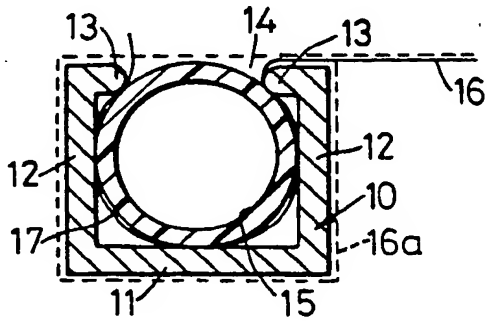

FIG.1

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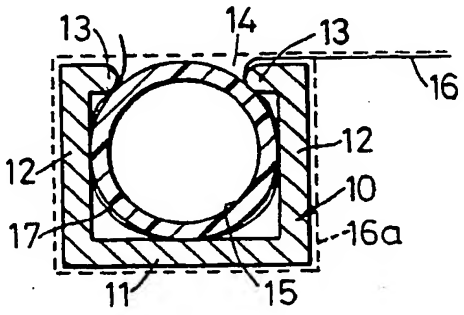

FIG.1

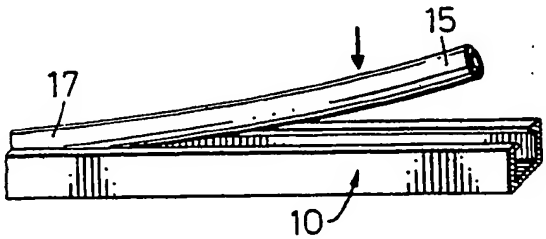

FIG.2

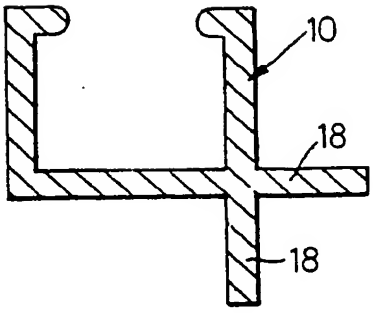

FIG.3

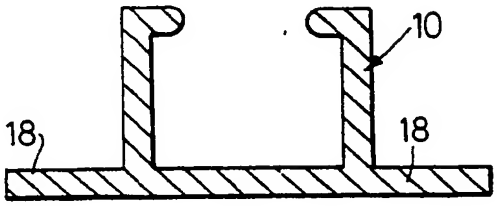

FIG.4

SPECIFICATION

Improvements in or relating to securing flexible sheet material

There are many situations where it is required to secure firmly the edges of a sheet of flexible material, and particularly sheet plastics material such as polythene. For example, sheet polythene is commonly used to provide temporary covers, such as covers for broken windows, or shelters and dust preventers for building works, as well as for use in more permanent structures such as greenhouses and as pool liners. Whatever the use, it is generally necessary to secure the sheet of polythene firmly along at least one edge thereof. This is commonly effected by stapling, clipping or tacking the polythene to a wooden strip at spaced intervals along the strip.

Not only is it time consuming to secure a sheet in this fashion, but the stress in the sheet is concentrated at each staple or other fastener, with consequent risk of tearing of the sheet when it is subjected to substantial loads. Furthermore, it is difficult and inconvenient to detach a sheet and reuse it in a different situation, and in any case a sheet which is so reused is likely to have been damaged by the fastenings. The present invention sets out to provide an improved device and method for securing flexible sheet material which secures a sheet quickly and conveniently, and yet which may be readily removed without damage to the sheet so that the sheet may be reused in a different situation.

According to the invention, a device for securing flexible sheet material comprises an element of substantially rigid material defining an elongate channel, and an elongate tube of resiliently flexible material, the dimensions of the tube being such that it may be received within the channel with its outer periphery resiliently engaging the walls of the channel, the mouth of the channel being of smaller width than the interior of the channel whereby the tube must be compressed in order to pass through the mouth of the channel and then expands, due to its resilience, when it is within the channel, so as to be retained therein.

In use, a longitudinal stretch of the sheet material, usually adjacent one edge, is first laid across or within the channel, which may if required first be mounted on a support, and the flexible tube is then pressed through the mouth of the channel, on top of the sheet material, so as to trap the sheet material between the tube and the interior walls of the channel. Due to the resilient expansion of the tube once it has passed into the channel, the tube is restrained against passing back out of the channel and tension on the sheet material tends to force the tube more firmly against the interior walls of the channel, thus securely retaining the sheet material within the channel. However, when it is required to detach the sheet material from the device, the tube may be readily removed from the channel by levering it out of the channel from one end, thus freeing the sheet material.

Preferably the outer wall of the tube engages the inner walls of the channel at at least five peripherally spaced locations around the tube, when the tube is located within the channel.

The tube is preferably substantially circular in cross-section, and may be formed from polythene, although any other suitable resiliently flexible material may be employed.

The interior of the channel may be generally rectangular in cross-section, the reduced-width mouth of the channel being defined by flanges projecting inwardly from the opposite side walls thereof.

The elongate channel may be defined within any shape of element, but preferably the element is itself an elongate channel-sectioned element. In this case the element may be provided with one or more longitudinal external flanges for mounting the element on a support. The element defining the channel may be formed from substantially rigid plastics material, or any other suitable material.

There may be provided a further elongate element dimensioned to extend longitudinally within the tube and to pass, with the tube, through the mouth of the channel. For example, the further elongate element may be secured, at one end thereof, within the channel in such manner that it may extend at an angle out of the channel, whereby the tube may be passed over the elongate element before it is swung through the mouth of the channel into the interior thereof. The provision of such a further elongate element over which the tube may be passed facilitates the pressing of the tube into the channel.

Alternatively, the further elongate element may be of greater width than the mouth of the channel and may be slid longitudinally into the interior of the tube after the tube has been pressed into the channel, thereby preventing the tube from passing back out to the mouth of the channel.

In an alternative arrangement, means may be provided for sealing ends of the tube and supplying air under pressure to the interior thereof when the tube lies within the channel. This pressurisation of the interior of the tube will press the walls of the tube more firmly against the interior walls of the channel. For example, said means may include a self-sealing air valve at one end of the tube.

The following is a more detailed description of various embodiments of the invention, reference being made to the accompanying

drawings in which:

Figure 1 is a diagrammatic cross-section through a securing device according to the invention,

Figure 2 is a perspective view of a portion of the device, and

Figures 3 and 4 are sections through alternative forms of the channel-sectioned part of the device.

Referring to Figure 1, the device comprises an elongate channel-sectioned element 10 which may be formed, for example by extrusion, from substantially rigid plastics, aluminium, iron or any other suitable substantially rigid material. The element may be of any required length and the section will normally be provided in standard long lengths which may be cut to smaller sizes as required.

The element 10 provides a generally rectangular channel section comprising a bottom wall 11, side walls 12 and inwardly projecting flanges 13 along the free edges of the side walls 12, which flanges 13 define between them a mouth 14 of the channel.

The device also comprises a circular cross-section tube 15 formed from polythene or any other suitable resilient plastics or other material.

The elements of the device may be of any convenient size, but for the purposes of securing polythene or other sheeting up to a thickness of about .5mm, the tube 15 may have an inside diameter of 11mm and an outside diameter of 13mm. The channel section 10 may define an internal cavity of 13mm width by 10mm depth and may have a wall thickness of 2mm. The width of the mouth 14 of the channel may be 9mm. It will be appreciated however that these dimensions are given by way of example only.

In use, the channel section element 10 is first secured if required, to a fixed support by passing screws through the bottom wall 11 of the section. An edge portion of the sheet 16 of polythene or other sheet material is then laid across the open mouth 14 of the channel or may be poked into the channel. The tube 15 is then pressed into the channel, through the mouth 14 and on top of the sheet 16. As shown in Figure 2, the tube 15 may most conveniently be pressed into the channel by first pressing in one end, as indicated at 17, and then applying pressure progressively along the length of the tube towards the free end thereof so as to force it piece by piece through the mouth of the channel and into the interior thereof.

As seen in Figure 1, when the tube 15 has been forced into the interior of the channel a marginal portion 17 of the sheet is trapped between the periphery of the tube and the walls of the channel. Preferably the dimensions of the tube and channel are such that the periphery of the tube presses against the walls of the channel at at least five pressure points. In the arrangements of Figure 1 it will be seen that the tube presses against the bottom wall 11, each side wall 12, and against the lower inner corners of the flanges 13. The sheet 16 is thus firmly clamped at each of these pressure points and tension on the sheet 16 will merely tend to urge the tube more firmly against the sheet at at least some of these locations.

If required, the sheet 16, instead of extending directly away from the device as shown in solid line in Figure 1, may be wrapped around the channel section 10 as indicated at 16*a* in Figure 1. This provides a more secure fixing of the edge of the sheet to the device for some uses.

Instead of the tube 15 being circular in cross-section, as shown,it may be of any other suitable cross-section, so long as it is sufficiently compressible to pass through the mouth 14 of the channel section. For example, the tube may be so shaped as to have portions which extend into the corners beneath the flanges 13 when the tube lies within the section.

In order to provide positive and irremovable retention of the tube within the channel section, a comparatively rigid elongate element of greater width than the width of the mouth 14 may be passed longitudinally through the tube 15 once it is within the channel. Since the elongate element cannot pass through the mouth 14 of the channel, this ensures that the tube is positively locked within the channel. It may, of course, be removed by first sliding the further element longitudinally out of the tube.

In an alternative arrangement, an elongate strip is secured at one end within the channel 10 and extends at an angle out of the channel so that the tube 15 may be slid over the strip before the tube is pressed into the channel, with the strip. In this case, the dimensions of the internal strip must be such that it may pass, with the tube 15, through the mouth of the channel. It is found that the use of such a strip facilitates the pressing of the tube into the channel.

In an alternative arrangement (not shown) the tube 15 may be sealed at one end, by a suitable plug or clip, and provided at the other end with a self-sealing air valve which may be connected to an air pump so that the tube 15 may be pressurised once it has been introduced into the channel 10. A pressure of 8 to 12 psig (0.56 to 0.86 Kg/sq.cm.) within the tube will normally be sufficient, and such pressure may be applied by means of a hand pump or compressor. The pressurisation of the tube forces its peripheral wall more firmly against the interior walls of the channel and provides a firmer location of the tube within the channel. The tube may be readily removed from the channel by releasing the air pressure within the tube and then

levering the tube out of the channel from one end thereof.

Figures 3 and 4 show alternative forms of channel section provided with external flanges 18 to facilitate mounting of the channel section on an appropriate surface or other support.

It will be appreciated that there are many uses for the device for securing the edges of polythene or other flexible sheet material. For example, lengths of the device may be arranged around the sides of a window so as to permit a sheet of polythene to be secured across the window opening, for the purpose of temporary repair or for providing a double glazing effect.

Lengths of the securing device may also be secured together around the periphery of sheets of polythene to provide temporary tents and shelters, or lengths may be assembled to provide a more permanent structure such as a greenhouse or cold frane. The device may also be used to mount sheets of fabric or polythene to seal off areas within a larger building, for example to provide dust or draught free areas or to conserve heat within a portion of the building. Lengths of the device may also be used to secure together the edges of sheets of polythene or the like to form containers such as water troughs or buckets.

CLAIMS

1. A device for securing flexible sheet material comprising an element of substantially rigid material, defining an elongate channel, and an elongate tube of resiliently flexible material, the dimensions of the tube being such that it may be received within the channel with its outer periphery resiliently engaging the walls of the channel, the mouth of the channel being of smaller width than the interior of the channel whereby the tube must be compressed in order to pass through the mouth of the channel and then expands, due to its resilience, when it is within the channel, so as to be retained therein.

2. A device according to claim 1, wherein the outer wall of the tube engages the inner walls of the channel at at least five peripherally spaced locations around the tube, when the tube is located within the channel.

3. A device according to claim 1 or claim 2, wherein the tube is substantially circular in cross-section.

4. A device according to any of claims 1 to 3, wherein the tube is formed from polythene.

5. A device according to any of claims 1 to 4, wherein the interior of the channel is generally rectangular in cross-section, the reduced-width mouth of the channel being defined by flanges projecting inwardly from the opposite side walls thereof.

6. A device according to any of claims 1 to 5, wherein the element defining the elongate channel is an elongate channel-sectioned element.

7. A device according to claim 6, wherein the channel-sectioned element is provided with one or more longitudinal external flanges for mounting the element on a support.

8. A device according to any of claims 1 to 7, wherein the element defining the channel is formed from a substantially rigid plastics material.

9. A device according to any of claims 1 to 7, wherein the element defining the channel is formed from metal.

10. A device according to any of claims 1 to 9, comprising a further elongate element dimensioned to extend longitudinally within the tube and to pass, with the tube, through the mouth of the channel.

11. A device according to claim 10, wherein said further elongate element is secured, at one end, thereof, within the channel in such manner that it may extend at an angle out of the channel, whereby the tube may be passed over the elongate element before it is swung through the mouth of the channel into the interior thereof.

12. A device according to any of the preceding claims, wherein means are provided for sealing the ends of the tube and supplying air under pressure to the interior thereof when the tube lies within the channel.

13. A device according to claim 12, wherein said means include a self-sealing air valve at one end of the tube.

14. A device for securing flexible sheet material substantially as hereinbefore described with reference to the accompanying drawings.

15. A method of securing flexible sheet material, using a device according to any of the preceding claims, comprising laying a portion of the sheet material across the elongate channel, laying the tube on top of the sheet material and longitudinally of the mouth of the channel, and pressing the tube through the mouth of the channel and into the interior thereof, whereby a length of the sheet material is trapped between the outer periphery of the tube and the interior walls of the channel.

16. A method according to claim 15, wherein the portion of the sheet material is disposed at least partly within the channel before the tube is pressed into the channel.

17. A method according to claim 15 or claim 16, wherein the sheet material is wrapped at least partly around the outside of the element defining the elongate channel after the tube has been pressed into the channel.

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